TECHNICAL BENEFITS OF A TAPE DRIVE BASED ON THE EST

While the major benefit of a format including the EST would be low cost of ownership, there are other benefits to system reliability when compared to single reel formats.

Total cost of ownership - With the EST, guiding and tension control are contained in the cartridge. This leads to a simple, less costly, and inherently more reliable transport. Drive cost is especially important for small business. With 10 to 15 cartridges per drive, single reel format drive cost can be the majority of the total cost of ownership of the data storage.

Handling Robustness - A common complaint about some single reel formats is that they are too "flimsy". The EST cartridge contains an aluminum base-plate and a very stiff cover. This would give the EST cartridge a quality look and feel when compared to single reel formats.

Wind Quality - Belt-driven cartridges completely eliminate "popped strands". “Popped strands” are a significant quality issue inherent in all single reel cartridge formats. When single reel formats are run in the "shuffling" mode, the general wind quality degrades due to air entrainment. (Tale *of the Tape: Beware of Wind Quality*, Enterprise Storage Forum, Henry Newman, Aug 10,2004) This issue is eliminated by the belt drive in the EST.

Improved Precision to Enable High Track Density - Due to the action of the belt, there are no flanges needed on the hubs to control the tape. This eliminates the high frequency "flange hits" inherent in belt-less tape paths. The EST has stationary guides close to the head. This yields the best possible LTM (lateral tape motion)

Tape never leaves the cartridge - Single reel formats rely on a tenuous "baton pass" to attach the single reel tape to the take up reel in the drive. "Dropping" or breaking the leader during this operation can occur and leads to a load failure. In single reel formats, if the drive happens to shut down while running (e.g., a power off) the tape will be "stuck" in the drive. This can lead to the drive and cartridge being rendered disabled or in need of a lengthy recovery procedure. Since the tape is totally contained in the dual reel EST cartridge, a drive failure is easily overcome without destroying the tape by simply ejecting the cartridge.

Physical interchange variation - Single reel formats experience differences in the location of the cartridge spool relative to the drive guides. This variation limits the flange-to-flange spacing that can be used in the cartridge spool. The large flange spacing allows for larger performance degrading "popped strands". The variation can occur from drive to drive and from mount to mount of a cartridge in the same drive. Some single reel formats have a very short tape path and variations in the location of the cartridge relative to the guides can lead to high edge force on the tape or even buckling of the tape edge. The issue is eliminated in the EST.

Drive durability - Since magnetic tape needs to be durable, it is filled with hard particles. These particles create abrasive wear on drive guides. Issues associated with wear at the guide-tape interface can lead to premature drive failure. Since guiding is contained in the EST cartridge, quality issues associated with drive guide wear are eliminated.

Fast Access - The EST cartridge eliminates the need for a thread up step and also allows the cartridge to be stored at the middle of the tape. This allows for faster access to data like the fast access 9840 cartridge used in high-end tape storage systems.